



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,484	09/28/2001	Toru Ishida	H-1013	2783
7590	03/15/2004		EXAMINER	
Mattingly, Stanger & Malur, P.C. Suite 370 1800 Diagonal Road Alexandria, VA 22314			WILLIAMS, ALEXANDER O	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 03/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/964,484	ISHIDA ET AL.	
	Examiner	Art Unit	
	Alexander O Williams	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
 THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-31 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

Serial Number: 09/964,484 Attorney's Docket #: H-1013
Filing Date: 9/28/01;

Applicant: Ishida et al.

Examiner: Alexander Williams

Applicant's Amendment, filed 11/18/03, has been acknowledged.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 to 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohie (U.S. Patent # 6,580,164 B1) in view of Loder et al. (U.S. Patent # 5,777,345).

1. Ohie (**figures 1 to 31**) specifically **figures 17 and 18** show a semiconductor device **11** comprising: a first semiconductor chip **3** having on one main surface thereof a control circuit, a first bonding pad **5**, and a plurality of second bonding pads **5**; a second semiconductor chip **13** having on one main surface thereof a memory circuit and a third bonding pad **15** and disposed on the one main surface of the first semiconductor chip, the memory circuit being controlled in accordance with a control signal generated in the control circuit on the first semiconductor chip;

a first lead 9 having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed at a position around the first semiconductor chip; a plurality of second leads 9 each having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed at a position around the first semiconductor chip; a first bonding wire 7 for connecting the first bonding pad on the first semiconductor chip with the inner lead portion of the first lead; a plurality of second bonding wires 17 for connecting the plural second bonding pads on the first semiconductor chip with the inner lead portions of the plural second leads; a third bonding wire 17 for connecting the third bonding pad on the second semiconductor chip with the inner lead portion of the first lead; and a resin seal member 10 for sealing the first and second semiconductor chips, the first, second and third bonding wires, and the inner lead portions of the first and second leads.

In claim 1 and similar claims 5, 11, 18, 19, 23, 24, 28 and 29, Ohie fails to explicitly show wherein the control signal generated in the control circuit is outputted from the first bonding pad on the first semiconductor chip and is inputted to the third bonding pad on the semiconductor chip through the first bonding wire, the first lead and the third bonding wire.

Loder et al. is cited for showing a multi-chip integrated circuit package. Specifically, Loder et al. (figures 1 to 5) specifically figure 2 discloses a third bonding wire (**28 between 24 and 26**) wherein the control signal generated in the control circuit is outputted from the first bonding pad (**26 on one side of 12**) on the first semiconductor chip 12 and is inputted to the third bonding pad 24 on the second semiconductor chip 14 through the first bonding wire (**28 between 30 and 22**), the first lead 22 and the third bonding wire for the purpose of providing an electronic package which has a minimal footprint and can be assembled with conventional plastic injection molding techniques without adding expensive interconnection substrate components.

2. A semiconductor device according to claim 1, Ohie's second semiconductor chip is formed in a plane size smaller than that of the first semiconductor chip.
3. A semiconductor device according to claim 1, Ohie show an another main surface opposed of the second semiconductor chip opposed to the one main surface thereof is disposed on the one main surface of the first semiconductor chip in an opposed relation to the one main surface of the first semiconductor chip.
4. A semiconductor device according to claim 1, Ohie's first and third bonding wires are connected to one and same surface of the first lead.

5. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device 11 comprising: a first semiconductor chip 3 having on one main surface thereof a processor unit adapted to operate in accordance with a program and a plurality of bonding pads 5; a second semiconductor chip 13 having on one main surface thereof a non-volatile memory unit into which are written serial data by operation of the first semiconductor chip and also having a plurality of bonding pads 5, the second semiconductor chip being disposed on one main surface of the first semiconductor chip; a plurality of leads 9 each having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed at a position around the first semiconductor chip; and a resin seal member 10 for sealing the first and second semiconductor chips and the inner lead portions of the plural leads, wherein the plural bonding pads on the first and second semiconductor chips are electrically connected to the inner lead portions of the plural leads.

6. A semiconductor device according to claim 5, Ohie's first semiconductor chip is a chip for a microcomputer, and wherein the second semiconductor chip is a chip for an EEPROM.

7. A semiconductor device according to claim 5, Ohie's plural bonding pads on the first semiconductor chip include a first bonding pad, wherein the plural bonding pads on the second semiconductor chip include a second bonding pad, wherein the first bonding pad is electrically connected to an inner lead portion of one of the plural leads through a first bonding wire, wherein the second bonding pad is electrically connected to an inner lead portion of one of the plural leads through a second bonding wire, and wherein the serial data are outputted from the first bonding pad and inputted to the second bonding pad through the first bonding wire, one of the plural leads, and the second bonding wire.

8. A semiconductor device according to claim 5, Ohie's second semiconductor chip is formed in a plane size smaller than that of the first semiconductor chip.

9. A semiconductor device according to claim 5, Ohie show wherein another main surface of the second semiconductor chip opposed to the one main surface thereof is disposed on the one main surface of the first semiconductor chip in an opposed relation to the one main surface of the first semiconductor chip.

10. A semiconductor device according to claim 6, Ohie show wherein the first and second bonding wires are connected to one and same surface of one of the plural leads.

11. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device 11 comprising: a first semiconductor chip 3 having on one main surface thereof a first bonding pad 5 and a plurality of second bonding pads 5; a second semiconductor chip 13 having on one main surface thereof a plurality of third bonding pads (inherit) interconnected electrically, the second

Art Unit: 2826

semiconductor chip being disposed on the one main surface of the first semiconductor chip; a first lead **9** having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed at a position around the first semiconductor chip; a plurality of second leads **9** each having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed at a position around the first semiconductor chip; a first bonding wire for connecting the first bonding pad on the first semiconductor chip with the inner lead of the first lead; a plurality of second bonding wires **17** for connecting the plural second bonding pads on the first semiconductor chip with the inner lead portions of the plural second leads; and a resin seal member **10** for sealing the first and second semiconductor chips, the inner lead portions of the first, second and third leads, and the first, second and third bonding wires, but fail to explicitly show a third bonding wire for connecting one of the plural third bonding pads **15** on the second semiconductor chip with the inner lead portion of the first lead.

12. A semiconductor device according to claim 11, Orie show wherein the second semiconductor chip is formed in a quadrangular shape in plan, and wherein the plural third bonding pads are arranged along at least one side of the second semiconductor chip.
13. A semiconductor device according to claim 11, Orie show wherein the second semiconductor chip is formed in a quadrangular shape in plan, and wherein the plural third bonding pads are arranged along at least two sides contiguous to each other of the second semiconductor chip.
14. A semiconductor device according to claim 11, Orie show wherein the first bonding pad and the plural third bonding pads are bonding pads for signal.
15. A semiconductor device according to claim 11, Orie show wherein the second semiconductor chip is formed in a plane size smaller than that of the first semiconductor chip.
16. A semiconductor device according to claim 11, Orie show wherein another main surface of the second semiconductor chip opposed to the one main surface thereof is disposed on the one main surface of the first semiconductor chip in an opposed relation to the one main surface of the first semiconductor chip.
17. A semiconductor device according to claim 11, Orie show wherein the first and third bonding wires are connected to one and same surface of the first lead.
18. Orie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device **11** comprising: a first semiconductor chip **3** having on one main surface thereof a first bonding pad **5** and a second bonding pad **5** both disposed along one side of the one main surface; a second semiconductor chip **13** quadrangular in shape and having on one main surface thereof a third

bonding pad 15 and two fourth bonding pads (inherit) interconnected electrically, the third and fourth bonding pads being disposed along one side of the one main surface of the second semiconductor chip,

the third bonding pad being disposed between the fourth bonding pads, the second semiconductor chip being disposed on the one main surface of the first semiconductor chip in such a manner that the one side of the one main surface thereof is opposite to the one side of the one main surface of the first semiconductor chip; a first lead 9 and a second lead 9 each having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed outside the one side of the first semiconductor chip; a first bonding wire 7 for connecting the first bonding pad on the first semiconductor chip with the inner lead portion of the first lead; a second bonding wire 7 for connecting the second bonding pad on the first semiconductor chip with the inner lead portion of the second lead; a third bonding wire 17 for connecting the third bonding pad on the second semiconductor chip with the inner lead portion of the first lead; a fourth bonding wire 17 for connecting one of the two fourth bonding pads on the second semiconductor chip with the inner lead portion of the second lead; and a resin seal member for sealing the first and second semiconductor chips, the inner lead portions of the first and second leads, and the first, second, third and fourth bonding wires.

19. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device 11 comprising: a first semiconductor chip 3 which is quadrangular and which has a first bonding pad 5 on one side of one main surface thereof; a second semiconductor chip 13 which is quadrangular and which has a second bonding pad 15 on one side of one main surface thereof, the one side of the one main surface of the second semiconductor chip being disposed on the one main surface of the first semiconductor chip in an opposed relation to the one side of the one main surface of the first semiconductor chip; a lead 9 having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed outside the one side of the first semiconductor chip; a first bonding wire 7 connecting the first bonding pad on the first semiconductor chip with the inner lead portion of the lead; a second bonding wire 17 for connecting the second bonding pad on the second semiconductor chip with the inner lead portion of the lead; and a resin seal member 10 for sealing the first and second semiconductor chips, the inner lead portion of the lead, and the first and second bonding wires, wherein the second semiconductor chip is disposed on the one main surface of the first semiconductor chip in a state such that a central point of the second semiconductor chip is displaced so as to be positioned on one side of the first semiconductor chip with respect to a central point of the first semiconductor chip.

20. A semiconductor device according to claim 19, Ohie show wherein the central point of the first semiconductor chip is a point of intersection of a first center line extending in the same direction as the one side of the first semiconductor chip and a second center line orthogonal to the first center line, and wherein the central point of the second semiconductor chip is a point of intersection of a first center line extending in the same direction as the one side of the second semiconductor chip and a second center line orthogonal to the first center line.

21. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device **11** comprising: a first semiconductor chip **3** which is quadrangular in plan and which has a first bonding pad **5** on a first side of one main surface thereof and a second bonding pad **5** on a second side of the one main surface contiguous to the first side; a second semiconductor chip **13** which is quadrangular in plan and which has a third bonding pad **15** on one side of one main surface thereof and a fourth bonding pad **15** on a second side of the one main surface contiguous to the first side; the second semiconductor chip being disposed on the one main surface of the first semiconductor chip in a state such that the first side of the one main surface thereof is opposed to the first side of the first semiconductor chip and the second side of the one main surface thereof is opposed to the second side of the first semiconductor chip; a first lead **9** having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed outside the first side of the first semiconductor chip; a second lead **9** having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed outside the second side of the first semiconductor chip; a first bonding wire **7** for connecting the first bonding pad on the first semiconductor chip with the inner lead portion of the first lead; a second bonding wire **17** for connecting the first bonding pad on the second semiconductor chip with the inner lead of the first lead; a third bonding wire **17** for connecting the second bonding pad on the first semiconductor chip with the inner lead of the second lead; a fourth bonding wire **17** for connecting the second bonding pad on the second semiconductor chip with the inner lead of the second lead; and a resin seal member **10** for sealing the first and second semiconductor chips, the inner lead portions of the first and second leads, and the first to fourth bonding wires, wherein the second semiconductor chip disposed on the one main surface of the first semiconductor chip in a state such that a central point thereof is displaced so as to be positioned on the first and second sides of the first semiconductor chip.

22. A semiconductor device according to claim 21, Ohie show wherein the central point of the first semiconductor chip is a point of intersection of a first center line extending in the same direction as the first side of the first semiconductor chip and a second center line orthogonal to

the first center line, and wherein the central point of the second semiconductor chip is a point of intersection of a first center line extending in the same direction as the first side of the second semiconductor chip and a second center line orthogonal to the first center line.

23. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device 11 comprising: a first semiconductor chip 3 which is quadrangular and which has a first bonding pad 5 on one side of one main surface thereof; a second semiconductor chip 3 which is quadrangular and which has a second bonding pad (inherit) on one side of one main surface thereof, the second semiconductor chip being disposed on the one main surface of the first semiconductor chip; a lead 9 having an inner lead and an outer lead integral with the inner lead, the inner lead being disposed outside the one side of the first semiconductor chip; a first bonding wire 7 for connecting the first bonding pad on the first semiconductor chip with the inner lead portion of the lead; a second bonding wire 17 for connecting the second bonding pad on the second semiconductor chip with the inner lead portion of the lead; and a resin seal member 10 for sealing the first and second semiconductor chips, the inner lead portion of the lead, and the first and second bonding wires, wherein the second semiconductor chip is disposed on the first semiconductor chip in a state such that one side of the second semiconductor chip is opposed to two sides contiguous to each other of the first semiconductor chip so as to shorten the length of the second bonding wire.

24. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device 11 comprising: a first semiconductor chip 3 having a first main surface and a second main surface opposed to each other, with a plurality of bonding pads 5 being formed on the first main surface; a second semiconductor chip 13 having a first main surface and a second main surface opposed to each other, with a plurality of bonding pads 5 being formed on the first main surface, the second semiconductor chip being disposed on the first semiconductor chip in a state such that the second main surface thereof is opposed to the first main surface of the first semiconductor chip, the second semiconductor chip being smaller in plane size than the first semiconductor chip; a plurality of leads each having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed at a position around the first semiconductor chip; and a resin seal member 10 for sealing the first and second semiconductor chips, the inner lead portions of the plural leads, and the plural bonding wires, wherein the second semiconductor chip is smaller in thickness than the first semiconductor chip, but fail to explicitly show a plurality of bonding wires for connecting the plural bonding pads on the first and second semiconductor chips with the inner lead portions of the plural leads respectively.

25. A semiconductor device according to claim 24, Ohie show wherein the second semiconductor chip is bonded to the first main surface of the first semiconductor chip through an adhesive layer.

26. A semiconductor device according to claim 25, Ohie show wherein the adhesive layer is formed by a bonding resin film.

27. A semiconductor device according to claim 25, Ohie show wherein the distance from the first main surface of the first semiconductor chip to the second main surface of the second semiconductor chip is smaller than the thickness of the first semiconductor chip.

28. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device 11 comprising: a first semiconductor chip 3 having a first main surface and a second main surface opposed to each other, with a plurality of bonding pads 5 being formed on the first main surface; a second semiconductor chip 13 having a first main surface and a second main surface opposed to each other, with a plurality of bonding pads 15 being formed on the first main surface, the second semiconductor chip being disposed on the first semiconductor chip in a state such that the second main surface thereof is opposed to the first main surface of the first semiconductor chip, the second semiconductor chip being smaller in plane size than the first semiconductor chip; a plurality of leads 9 each having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being disposed at a position around the first semiconductor chip; and a resin seal member 10 for sealing the first and second semiconductor chips, the inner lead portions of plural leads, and the plural bonding wires, wherein the bonding pads on the second semiconductor chip are larger in plane size than the bonding pads on the first semiconductor chip, but fail to explicitly show a plurality of bonding wires for connecting the plural bonding pads on the first and second semiconductor chips with the inner lead portions of the plural leads respectively.

29. Ohie (figures 1 to 31) specifically figures 17 and 18 show a semiconductor device 11 comprising: a first semiconductor chip 3 having a first main surface and a second main surface opposed to each other, with a plurality of quadrangular bonding pads 5 being formed on the first main surface; a second semiconductor chip 13 having a first main surface and a second main surface opposed to each other, with a plurality of quadrangular bonding pads (inherit) being formed on the first main surface, the second semiconductor chip being disposed on the first semiconductor chip in a state such that the second main surface thereof is opposed to the first main surface of the first semiconductor chip, the second semiconductor chip being smaller in plane size than the first semiconductor chip; a plurality of leads 9 each having an inner lead portion and an outer lead portion integral with the inner lead portion, the inner lead portion being

disposed at a position around the first semiconductor chip; a plurality of first bonding wires 7 for connecting the plural bonding pads on the first semiconductor chip with the inner lead portions of the plural leads respectively; a plurality of second bonding wires 17 for connecting the plural bonding pads on the second semiconductor chip with the inner lead portions of the plural leads respectively; and a resin seal member 10 for sealing the first and second semiconductor chips, the inner lead portions of the plural leads, and the first and second bonding wires, wherein the bonding pads on the second semiconductor chip are each formed in a rectangular shape wherein a side located in an extending direction of the bonding wires is longer than a side opposed to the leads.

30. A semiconductor device according to claim 29, Ohie show wherein the bonding pads on the second semiconductor chip are larger in plane size than the bonding pads on the first semiconductor chip.

31. A semiconductor device according to claim 29, Ohie show wherein the second bonding wires each have a first portion extending in a direction perpendicular to the first main surface of the second semiconductor chip and a second portion extending along the first main surface of the second semiconductor chip, and wherein the first portion is positioned above the inner lead portions.

Therefore, it would be obvious of one of ordinary skill in the art at the time of the invention to use Loder et al.'s wire connecting the second semiconductor to the first semiconductor to the inner lead to modify Ohie's wiring connection structure of the stacked device for the purpose of providing an electronic package which has a minimal footprint and can be assembled with conventional plastic injection molding techniques without adding expensive interconnection substrate components.

The listed references are cited as of interest to this application, but not applied at this time.

Response

Applicant's arguments filed 11/18/03 have been fully considered, but are moot in view of the new grounds of rejections detailed above.

Field of Search	Date
U.S. Class and subclass: 257/723-25,728,777,784,786,666,676,685,686,692, 696,698,796,777,684	11/25/02 7/10/03 3/4/04
Other Documentation: foreign patents and literature in 257/723- 25,728,777,784,786,666,676,685,686,692, 696,698,796,777,684	11/25/02 7/10/03 3/4/04
Electronic data base(s): U.S. Patents EAST	11/25/02 7/10/03 3/4/04

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander O Williams whose telephone number is (571) 272 1924. The examiner can normally be reached on M-F 6:30-7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272 1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AOW
3/4/04


Alexander Williams
Primary Examiner